



**US Army Corps
of Engineers**
Detroit District

Great Lakes Update

2007 Annual Summary

Lake Superior and Lake Michigan-Huron are currently in their longest stretches of below average water levels since 1918. Lake Superior set new record low water levels in August and September breaking records set in 1926. Well above average rainfall from mid September through the end of October lifted Lake Superior's water level 9 inches. Lake Michigan-Huron has not yet set any new records, but with continued dry conditions, new marks could be set in early 2008. Lakes St. Clair, Erie and Ontario began 2007 with above average water levels. Dry conditions then set in across the Great Lakes region, leading to below average levels by years end. See Figure 1.

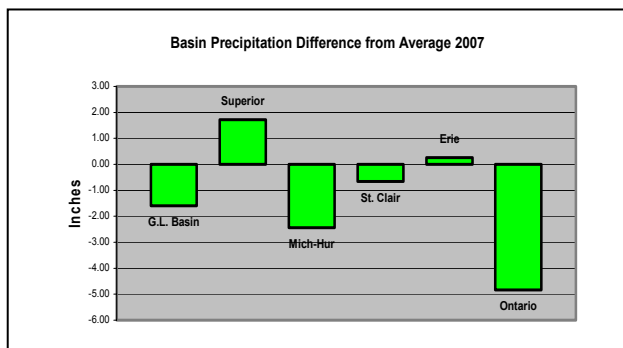


Figure 1: 2007 Great Lakes Precipitation

Hydrology

Ice cover in 2006/2007 was slow to develop due to a very warm December and early January. During September Houghton, MI recorded 18 days with a high temperature above 32 degrees. When arctic air arrived in mid-January, the Great Lakes were largely ice free, setting up an ideal

environment for large scale evaporation rates. Nine inches of water evaporated from Lake Superior during January and February. Figure 2 shows the extent of maximum ice cover on the Great Lakes. Lakes Erie and St. Clair had a complete ice cover, while the remaining lakes had varied ice. Figure 3 shows January and February evaporation.

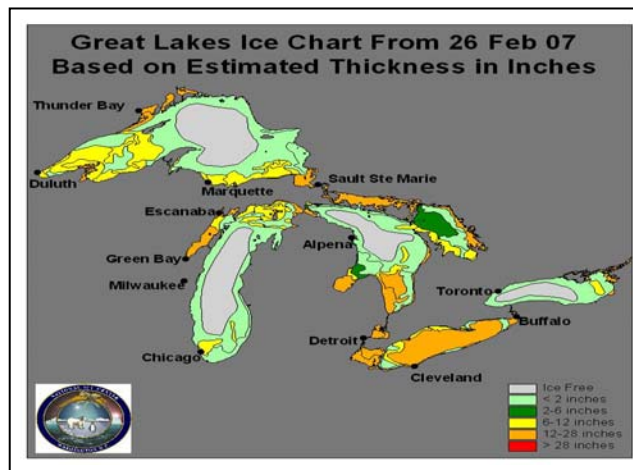


Figure 2: Great Lakes Ice Cover

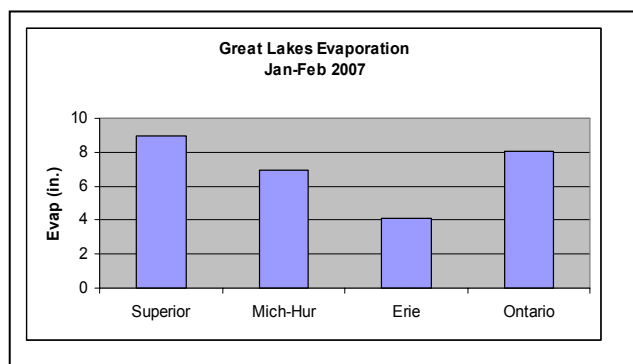


Figure 3: Great Lakes Evaporation

Figure 4 shows the snow water equivalent (SWE) across the upper Great Lakes basin was 60% below average in 2007. During its peak in early march, SWE values were 6 to 8 inches in the major snowbelt regions and 1-4 inches across the northern shoreline of Lake Superior. The National Weather Service (NWS) conducts snow surveys using low-flying aircraft over the Lake Superior drainage basin each year to help in predictions of water supplies to the Great Lakes. A similar survey will be made this winter and the results will be used to forecast water levels for the Great Lakes for the spring-autumn period.

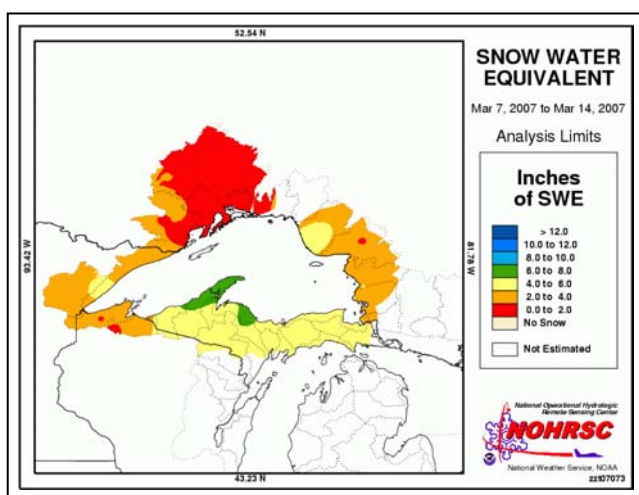


Figure 4: Snow Water Equivalent

Runoff from melting snow combined with increased spring rainfall brings on the period of seasonal rise on the Great Lakes. During the spring of 2007, the combination of below average SWE and below average rainfall led to lower than average seasonal rises on all of the Great Lakes.

Forecast

The Climate Prediction Center (CPC) of the NWS issues seasonal outlooks for both temperature and precipitation conditions. The CPC's latest winter outlooks for the Great Lakes region indicate an increased chance for above average precipitation and temperature conditions. These outlooks are mostly based on a moderate La Nina pattern, consistent with cooler Pacific Ocean sea surface temperatures. If the

predictions for increased precipitation hold true, water levels on the Great Lakes could climb closer to their long-term averages.

The latest forecast of lake levels predicts higher water levels on Lake Superior when compared to 2007. The remaining lakes are forecasted to be well below their levels of 2007. Given dry conditions, Lake Michigan-Huron could set new record lows in early 2008.

Water Levels

The "Monthly Bulletin of Lake Levels for the Great Lakes" displays water levels on the Great Lakes for the years 2006 and 2007. The following discussion is based on monthly mean levels.

Lake Superior levels started 2007 at 600.13 feet, about 17 inches below its January long-term average (LTA). Levels peaked in October at 600.98 feet, about 13 inches below its October LTA. Lake Superior normally peaks in August. Lake Superior levels ended the year at 600.75 feet, about 12 inches below its December LTA.

Lakes Michigan-Huron began the year at 577.43 feet, about 13 inches below its January LTA. The lakes peaked in June, one month earlier than usual, at 577.69 feet, about 19 inches below the June LTA. The year ended with the level at 576.38, about 27 inches below the December LTA.

Lake St. Clair levels started the year at 570.05 feet, about 5 inches above its January LTA. Levels peaked in May, two months earlier than usual, at 574.21 feet, about 4 inches below the May LTA. Levels ended the year at 572.70 feet, about 14 inches below the December LTA.

Lake Erie began 2007 at 571.88 feet, about 13 inches above its January LTA. Levels peaked in May, a month earlier than usual, at 572.05 feet, about 2 inches above its May LTA. Levels ended the year at 570.44 feet, about 5 inches lower than the December LTA.

Lake Ontario started the year at 246.00 feet, about 17 inches above its January LTA. Levels peaked in May, a month earlier than usual, at 246.23 feet, about 2 inches above the May LTA. The year ended with the level at 243.83 feet, about 8 inches below the December LTA.

Lake Superior Regulation

During 2007 Lake Superior water levels remained below average setting new August and September record low monthly mean levels of 600.43 and 600.46 feet respectively, about 1/2 and 4 inches below the previous 1926 record lows of 600.46 and 600.79 feet respectively. Outflows continued to be set by the International Lake Superior Board of Control (Board) using Regulation Plan 1977-A. The Board is a bi-national body that reports to the International Joint Commission (IJC) on boundary water management issues including the management of Lake Superior outflows. Flow changes resulting from monthly Lake Superior regulation are accomplished by varying the amount of water allocated to hydropower production and, when necessary, opening or closing gates in the Compensating Works at the head of the St. Marys Rapids.

Water supplies to Lake Superior were below average for 2007. Only March, September and October supplies were above average. Annual precipitation over the Lake Superior basin was above average during 2007. While March, April, June, September and October were the only months with above average precipitation, September and October alone contributed 12.39 inches, 6.07 inches above the usual amount for these months.

A one-half gate open setting was maintained during 2007 in the Compensating Works in order to maintain minimum flow requirements in the St. Marys Rapids and to support spawning in the fishery. As the result of recalibration flow measurements made in 2006 it was determined that instead of four gates set at 10-inches a

setting of 8-inches each more closely represented a one-half gate open setting. The 8-inch setting was adopted with the monthly May 2007 regulation cycle.

Flow variations due to peaking and ponding operations by the hydropower plants at Sault Ste. Marie, Michigan and Ontario cause St. Marys River water levels downstream from the plants to fluctuate. When Lake Superior levels and outflows are below average, these fluctuations can be of concern to commercial navigation. On weekends and holidays ponding by the hydropower entities is suspended with an 8-hour window of peak flow required for each weekend and holiday day. After study the Board recommended to the IJC, by letter dated October 2, 2007, that the reference threshold level governing decisions to suspend ponding by St. Marys River hydropower operations be lowered from 578.7 feet to 577.7 feet (IGLD 1985) as measured at the U.S. Slip Gauge. This recommendation was formally approved by the IJC in an October 31, 2007 letter to the Board and implemented for the November outflow regulation cycle. U.S. Slip Gauge levels remained below the new threshold level so ponding by the hydropower entities continued to be suspended on weekends and holidays through December 2007. Ponding was suspended on weekends and holidays by the Board during the

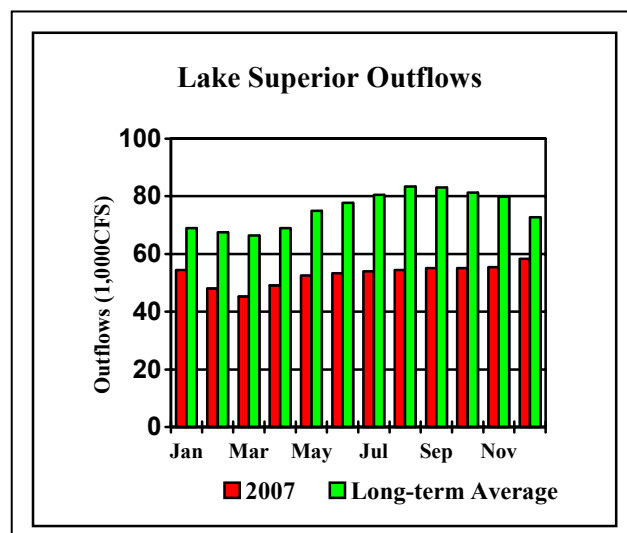


Figure 5: Lake Superior Outflows

navigation season starting with the opening of the Soo Locks on March 25, 2007 and extending through the end of the year.

Outflows were 30% below average in 2007, ranging from a low of 45,200 cubic feet per second (cfs) in March to a high of 58,300 cfs in December. Figure 5 above compares the monthly Lake Superior outflows in 2007 to long-term average flows for the 1900-1999 period of record.

Lake Ontario Regulation

Well above average supplies to Lake Ontario over the October through early December 2006 period resulted in a December 13, 2006 level of 245.50 feet, 12 inches above its LTA and 10.5 inches above its December 2005 level with 2 inches of water still stored on the lake as the result of previous over- and under-discharges.

Concerned that the level would exceed the upper regulation limit of 247.27 feet the International St. Lawrence River Board of Control (ISLRBC) decided to reduce flows over a three week period by about 25,000 cubic feet per second (cfs) per week until the January 2007 Plan 1958-D outflow was reached. This action moderated level fluctuations on Lake St. Lawrence and downstream, provided more consistent levels for navigation and more efficient use of water by hydropower. The December 2006 outflow of 277,900 cfs was 119% of average, and Lake Ontario's level ended 2006 at 245.60 feet. By January 5, 2007 the net result of ISLRBC authorized over-discharges was a Lake Ontario level 2.5 inches lower than it would have been if Plan 1958-D had been strictly followed.

Expected high water supplies in February caused the ISLRBC to continue over-discharging to prevent Lake Ontario levels from exceeding the 247.27 foot limit. However, overall February supplies were below average and combined with high outflows the Lake's level was 245.67 feet at the end of February, 10.2 inches above the LTA and 0.8 inches above 2006 levels. The level was

7.9 inches lower than it would have been if specified Plan 1958-D outflows had been released. Continued low supplies in March combined with previously authorized over-discharges resulted in an end-of-March level of 245.80 feet, 6.3 inches above its LTA

Ice retardation suppressed Lake St. Lawrence levels and on March 21st the Seaway Authority requested a decrease in flows by 7,100 cfs in order to raise levels. This was done over a 40 hour period from March 21st to 22nd when flows were returned to Plan 1958-D levels. Ice in the Beauharnois Canal and the International Section had virtually disappeared by March 27th and 28th respectively.

By the ISLRBC's April 17th meeting the risk of exceeding Lake Ontario's upper level limit had passed and the Ottawa River freshet was not expected to cause flooding in Montreal so a strategy of gradually returning water to the lake was adopted. By the end of April lake levels were at 246.33 feet, 6.3 inches higher than at the beginning of April, but 7.8 inches lower than it would have been if Plan 1958-D had been followed. The Lake Ontario's level peaked on May 1st, six weeks earlier than usual, at 246.36 feet, 1.2 inches above its LTA and 9.8 inches higher than a year earlier. Low May supplies resulted in an end of month level of 246.16 feet, 0.8 inches below its LTA, and 6.1 inches lower than if Plan 1958-D had been followed. During May the lake fell 2.4 inches while it usually rises 3.1 inches in May.

Below average water levels on the upper Great Lakes and Lake Erie as well as below average precipitation over the Lake Ontario basin contributed to low supplies to Lake Ontario. The ISLRBC continued its April 17th strategy keeping June outflows below Plan 1958-D specifications in an effort to restore all or most of the lost water to the lake by the end of the year. Lake Ontario's level fell 4.3 inches to 245.76 feet, 4.7 inches below its LTA. The April strategy was again followed in July resulting in an end of month level of 245.44 feet, 5.5 inches

below its LTA. The lake was now 3.3 inches lower than it would have been if Plan 1958-D had been followed and 8.7 inches below its year ago level.

While August precipitation over the Lake Erie basin was a near record high at 6.5 inches, precipitation over the Lake Ontario basin was well below average resulting in a supply with a 98% exceedance probability. The April strategy was continued. However, due to Seaway concerns about low Lake St. Louis levels, flows were not reduced as much below those specified by Plan 1958-D as was done previously. Lake Ontario's level fell 7.1 inches to 244.85 feet by the end of the month, 7.1 inches below its LTA.

During 2007 much of the Great Lakes basin was in a prolonged drought. New monthly record low levels were set in Montreal Harbour during September through December. Again the ISLRBC elected to continue the April strategy. In order to maintain levels on Lake St. Louis above 67.6 feet flows higher than those called for by Plan 1958-D were authorized. At the end of September Lake Ontario's level was 244.39 feet, 7.5 inches below its LTA.

A 24-hour flow increase from October 12th to 13th of 10,600 cfs was authorized to assist recreational boating interests with seasonal haul out and relocation in Lake St. Louis. On October 16th the ISLRBC decided to continue authorizing short term outflow increases as necessary to maintain Point-Claire levels above 67.6 feet in order to allow incoming vessels to reach the Port of Montreal. Any opportunities to reduce outflows in order to restore water to Lake Ontario would be taken with the goal of restoring as much water to the lake as possible by year's end. The end of October Lake Ontario level was 244.39 feet, 7.5 inches below its LTA.

November saw near record low flows in the Ottawa River contributing to low levels in the Montreal area. The ISLRBC continued with its current strategy. In order to maintain Lake St. Louis levels above 67.6 feet, the minimum level

required by the Seaway, flows greater than called for by Plan 1958-D were authorized.

On December 12th the ISLRBC reviewed the Lake Ontario-St. Lawrence River system with increasing concern due to the continued low supplies and levels as well as the low levels of the Upper Great Lakes and three months in a row of record low levels in the Montreal Harbor area. The ISLRBC agreed to short term outflow increases in order to maintain Pointe-Clair levels at 67.6 feet until the navigation season ended. At the same time any opportunities to restore water to Lake Ontario would be taken advantage of. Lake Ontario's December 31, 2007 level was 244.23 feet, about 5 inches below its LTA and 16.4 inches lower than at the start of the year.

Figure 6 below compares 2007 Lake Ontario outflows with period of record (1900-1999) monthly LTA outflows. Further information on ISLRBC activities can be found on the internet at: <http://www.islrbc.org>.

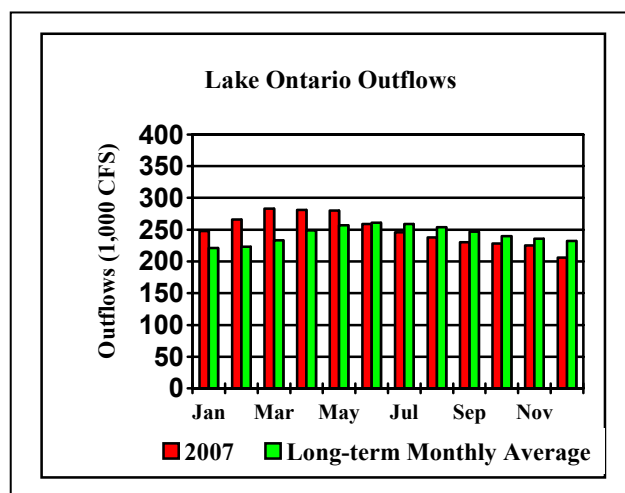


Figure 6: Lake Ontario Outflows

Public Concerns

The impacts of below average water levels on shipping, access, shoreline property, wetlands, businesses, erosion and water quality continue to be cause for concern. The news media continue to follow the situation closely as evidenced by frequent requests for updates on the lake levels and factors affecting them.

Upper Great Lakes Plan of Study

The International Upper Great Lakes Study (the Study) was launched in early 2007 by the International Joint Commission of the U.S. and Canada (IJC). The Study has two parts:

First is a five year independent examination of the regulation plan for outflows from Lake Superior (through the dams and control structures at Sault Ste. Marie) to see whether the regulation plan can be improved to take into account changing interests and a changing climate.

Second, the scope of the Study was expanded in 2006 to include a three year focus on possible erosion in the St. Clair River channel and whether changes in the conveyance capacity of the river might be the cause of lower water levels in Lakes Michigan and Huron. In 2007, in response to concerns of public interest groups and public officials, the time frame of the St. Clair River part of the Study was reduced to two years.

With an emphasis on binational, joint fact-finding and sound science, the Study will provide the IJC, and ultimately the governments and the public, with credible findings regarding the causes of low water levels and recommendations to improve the management of levels and flows in the Upper Great Lakes. A plan for ongoing independent peer review of key aspects of the Study has been developed

The Study has two basic scientific Task Teams—one for the St. Clair River and one for regulation of outflows from Lake Superior. Each Task Team supervises Technical Work Groups (TWG's) that make decisions about specific research projects. For example, there is a Hydroclimatic TWG that is studying how hydrological factors and climatic variability might account for changes in the amount of water flowing into the Upper Great Lakes. Another TWG is looking at sediment processes

and sediment models to determine if the river bed is eroding.

Scientific work is well underway, including video examination of the St. Clair River bed, cross-sectional river surveys, bed load and suspended sediment sampling, compilation of 130 years of bathymetric data to create a GIS animation of river flow models, a study of the sensitivity of water levels to various supply scenarios, and a wide range of other activities. Initial results suggest that erosion is not ongoing in the portion of the river that has been studied to date. The installation of flow measurement gauges in the St. Marys, St. Clair and Niagara rivers has been recommended.

In 2007, the Study Board published two semi-annual progress reports, engaged more than 100 scientists to work on key projects, and began work on more than a half dozen research initiatives related to the St. Clair River. In addition, a Public Interest Advisory Group (PIAG) was appointed, with members bringing extensive experience from a wide range of interests, including ecosystem and environmental organizations, tourism and recreational boating, municipal and industrial water users, hydropower facilities, shoreline property owners and the shipping industry. During the year, PIAG met twice and is developing a schedule of public meetings and workshops to be held in 2008. Of critical importance, PIAG provides an avenue for the public to be informed about the Study as well as a conduit for the public to provide information to the Study that is important in the development of possible regulation plans.

The International Lake Ontario-St. Lawrence River Study

During the early part of 2007, the Commission continued to consider three options for regulating Lake Ontario outflows developed by its International Lake Ontario-St. Lawrence River Study Board. As well, the Commission asked plan formulators to develop additional options

that might address the concerns expressed by affected interests during the public comment period.

In June the Commission announced that it would release its proposed decision and supporting documents on future regulation in September 2007. The Commission also said that it would continue to consult with the governments of the United States and Canada because of their crucial roles as the applicants for the Moses-Saunders power project in the 1950s. By early September, it became clear that any potential changes in regulation options raised sufficient questions to require additional time for discussions with governments in the Lake Ontario and St. Lawrence River basin. These discussions would need to occur before a fully informed public consultation process could be carried out. Accordingly, the Commission announced on September 10 that it would continue discussions with governments and would postpone the planned public hearings and public comment period.

Consultations are continuing. Commission staff held two workshops to explore technical issues with government representatives. The Commission is pleased with the progress that is being made and expects that public hearings will be held in 2008 followed by a Commission decision on future regulation of Lake Ontario outflows.

Meetings with the Public

The International Lake Superior Board of Control held its annual public meeting on September 4, 2007 at Lake Superior State University, Sault Ste. Marie, Michigan.

The International Niagara Board of Control met with the public on September 12, 2007 in Niagara Falls, Ontario.

The International St. Lawrence River Board of Control held one meeting with the public in Brockville, Ontario on June 19, 2007. Two

public teleconferences were held. One was held on March 20, 2007 in Rochester, NY and Dorval (Montreal) Que., and the other was held September 18, 2007 in Oswego, NY and Cornwall, Ont. More information on the activities of this Board can be found on their website: <http://www.islrbco.org/>

Commercial Navigation

The Soo Locks opened the 2007 shipping season on March 25, 2007 as scheduled. Through November 2007, the estimated tonnage passing through the Soo Locks at Sault Ste. Marie, MI was about 1% below the comparable 2006 tonnage. U.S. and Canadian vessels carried 51.02 and 16.06 million short tons (MST) of cargo respectively, as compared to respective 2006 tonnages of 53.45 and 14.42 MST. Foreign flagged vessels carried about 3.93 MST, down from the 2006 tonnage of 4.05 MST.

An estimated total of 7,647 vessels had transited the locks as compared to 7,302 vessels the previous year. Cargo vessels totaled 4,803 compared to 3,830 the year before. There were 2,363 U.S. flagged vessels, 1,261 Canadian flagged vessels and 459 foreign flagged vessels (ocean going or "salties"). Other vessels transiting the locks such as pleasure craft, tour boats, Coast Guard and scientific research vessels numbered 3,564. The U.S. Locks will close on January 15, 2008 and reopen on March 25, 2008.

The Canadian lock at Sault Ste. Marie, Ontario opened on May 15, 2007. A serious, storm-induced malfunction on September 22 resulted in an early end to the season. A total of 2,223 vessels carrying 69,441 passengers had transited the locks by that point in the season. The vessels were primarily tour boats and pleasure craft, as well as some commercial and government vessels. The lock is expected to reopen on May 15, 2008.

Preliminary figures through November 2007 indicate the tonnage passing through the Lake

Ontario-Montreal section of the St. Lawrence Seaway was down about 11.3% from 2006 at about 29.2 million metric tons (MMT). Vessel traffic was down about 3.7% from 2006 at 2,633 (combined lake and ocean) vessels.

Preliminary data on the type of cargo transiting the Seaway through November 2007 include iron ore (up) 4% to about 9.1 MMT; iron and steel up 51.1% to about 1.6 MMT; grain down 12.3% to about 9.0 MMT; coal down 42% to 0.4 MMT; general cargo up 49.4% to about 2.2 MMT; and petroleum products up 8% to about 1.7 MMT. For additional details on Seaway activities visit their website on the Internet at <http://www.greatlakes-seaway.com/>. The St. Lawrence Seaway Development Corporation provided these figures.

New Lock

A new "Poe-sized" lock is proposed to replace the existing Davis and Sabin Locks at the Soo Locks complex at Sault Ste. Marie, MI. The purpose of this project is to provide for more efficient movement of waterborne commerce. The Assistant Secretary of the Army for Civil Works (ASA (CW)) has not yet approved the Limited Reevaluation Report (LRR). A preliminary review of the project economics was initiated in FY 2007 with additional detailed work planned for FY 2008 upon receipt of

project funds. Detailed design of the channel deepening/guide walls and lock chamber will also continue upon receipt of FY 2008 funds. The recently passed Water Resources Development Act of 2007 directs that construction of the new lock shall be at Federal expense.

2007 Great Lakes Updates

2006 Annual Summary, Vol. No. 166, January 2007.

Winter Work at the Soo Locks, Vol. No. 167, April 2007.

Current Water Level Conditions on the Great Lakes, Vol. No. 168, July 2007.

Lake Superior Water Levels—Then and Now, Vol. No. 169, October, 2007.

General Notes

All elevations shown in this article are referenced to the OGLD 1985 datum. Information about the Great Lakes water levels, outflows, and weather is available at: <http://www.lre.usace.army.mil/glhh>.